**3GPP SA WG2 Meeting #152E e-meeting S2-22xxxxx**

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**Title: KI #1, Sol #2: Update to remove ENs**

**Document for: Discussion/Approval**

**Agenda Item: 9.6**

**Work Item / Release: FS\_DetNet / Rel-18**

*Abstract of the contribution: This contribution proposes to address editor’s notes in Solution #2.*

# 1 Discussion

The aim of this paper is to update Solution 2 in TR 23.700-46 by addressing/discussing editor’s notes (ENs).

### 1.1 Addressing EN 1

Editor's note：The signalling protocol between NEF and DetNet control is FFS..

* Enhance the function of NEF to support the authentication of DetNet controller.
* The signalling protocol between NEF and DetNet control uses IETF Netconf [8] or Restconf [9].

### 1.2 Addressing EN 2

Editor's note：It is FFS if and how the links corresponding to the PDU Sessions are reported.

When the PDU session is established, the UPF detects the DetNet node on the N6 interface, associates it with the PDU session, and sends the information to the SMF in the N4 PDU session update message, and the SMF forwards it to the NEF for external reporting.

### 1.3 Addressing EN 3

Editor's note：It is FFS how the UPF information about the identification and link of adjacent DetNet nodes information is reported and whether this reporting impacts the PCF and TSCTSF.

The UPF reports the identification and link of adjacent DetNet nodes information to the SMF on the N4 interface. And the SMF forwards the information to the NEF. There are no impacts on the PCF and TSCTSF.

# 2 Proposed changes

It is proposed to agree the following changes to TR 23.700-46, regarding Solution #2:

\*\*\*\*\* Beginning of CHANGES \*\*\*\*\*

## 6.2 Solution #2 for Key Issue #1: Network function enhancement to support 5GS DetNet node reporting

### 6.2.1 Introduction

In 5G mobile network, in order to realize DetNet deterministic forwarding mechanism and ensure the certainty of wide area, the DetNet control plane requires the DetNet node to report relevant information to the DetNet control plane before issuing the strategy.

IETF RFC8655 stipulates that DetNet nodes need to report corresponding information to DetNet control plane, including recognization of adjacent DetNet nodes.

Therefore, as a DetNet node, 5GS system should also report corresponding information to the DetNet control plane to assist the DetNet control plane in making corresponding forwarding strategy.

This report puts forward the method for the DetNet control plane to obtain the topology of adjacent 5GS DetNet node, and defines the mechanism of 5GS as a DetNet node to the DetNet control plane. An enhanced architecture supporting the reporting of mobile network information to DetNet control layer is designed. The architecture enhances the functions of NEF, SMF, and UPF respectively, so as to support the information collection, subscription and reporting of DetNet capability.

### 6.2.2 Functional Description



Figure 6.2.2-1 Enhanced architecture and network function

As shown in the figure1, the 3GPP exposure architecture is enhanced to support DetNet node reporting. Extend NEF function to support the capability exposure of DetNet node, and extend SMF, and UPF to support DetNet information reporting function. The related network functions are enhanced to support following features:

* Extend NEF function to support the exposure of DetNet capability:
  + Receive the capability exposure subscription from DetNet control plane, and report related ability to it;
  + Forward DetNet information reporting requirements to SMF based on DetNet controller subscription, including reporting contents, reporting frequency, etc;
  + Enhance the function of NEF to support the authentication of DetNet controller.
  + The signalling protocol between NEF and DetNet control uses IETF Netconf [8] or Restconf [9].
* Expand SMF to support DetNet information reporting function. Based on the reporting requirements issued by NEF, SMF receives DetNet related information reported by UPF on N4 interface, and sends it to NEF as required;
* Expand UPF to support DetNet information reporting function, and report the following information through N4 interface;
  + Identity and link with adjacent DetNet nodes: the identification of surrounding nodes can be obtained through routing broadcast messages on N6.
  + When the PDU session is established, the UPF detects the DetNet node on the N6 interface, associates it with the PDU session, and sends the information to the SMF in the N4 PDU session update message, and the SMF forwards it to the NEF for external reporting.

The collection and reporting methods of network information are as follows:

* Reporting method of adjacent DetNet nodes for the UPF:
* UPF obtains identification of DetNet nodes around the N6 interface through BGP and other routing broadcast messages.
* UPF reports the identification and link of adjacent DetNet nodes to SMF through N4 interface, then opens the information to DetNet control plane.
* The UPF reports the identification and link of adjacent DetNet nodes information to the SMF on the N4 interface. And the SMF forwards the information to the NEF. There are no impacts on the PCF and TSCTSF.

### 6.2.3 Procedures



Figure 6.2.3-1 Subscription and reporting process of DetNet ability opening

1. Before issuing the forwarding strategy, or based on the need of periodic collection of the DetNet capability, the DetNet control plane subscribes the capability exposure to NEF, which includes the information to be reported ,reporting frequency and triggers;
2. NEF forwards the requested capability reporting requirements to SMF;
3. SMF subscribes the capability reporting of DetNet from UPF;
4. According to the subscription request, UPF collects the relevant information of DetNet on the network side, including N6 interface topology;
5. SMF integrates the reporting messages received on the N4 interface to form the reporting data of 5GS as a DetNet node, such as adjacent nodes, which can be collected by NEF and be reported to the DetNet controller;
6. NEF reports corresponding information to DetNet control plane;
7. The DetNet control plane generates the DetNet forwarding strategy based on the received reports.

In the above figure, 1-3 is the capability reporting subscription procedure, and 4-6 is the capability reporting procedure.

### 6.2.4 Impacts on existing entities and interfaces

The new requirements are mainly aimed at the functional enhancement of NEF, SMF,and UPF modules

Extend NEF to achieve

* Receiving subscription information from DetNet control plane and reporting related capabilities to the outside,
* Based on subscription requirements, send DetNet information reporting requirements to SMF, including the information to be reported, reporting frequency, etc.

Extend SMF to achieve

* Based on the reporting requirements issued by NEF, SMF receives DetNet related information reported by UPF on N4 interface.
* Comprehensively process relevant information and send it to NEF according to the required frequency or conditions.

Extend UPF to achieve

* Report the identity and link with adjacent DetNet nodes through N4 interface.
* The UPF reports the identification and link of adjacent DetNet nodes information to the SMF on the N4 interface. And the SMF forwards the information to the NEF. There are no impacts on the PCF and TSCTSF.

### 6.2.5 Solution evaluation

* Adjust the strategy in time when the network capability changes,
* Better ensure the implementation of certainty on WAN,
* Without significantly changing the original framework, the information requirements of DetNet control plane can be met by expanding the existing network function.

\*\*\*\*\* End of CHANGES \*\*\*\*\*